



# FOREST HEALTH PROTECTION

## Pacific Southwest Region

**FHP Report No. SS09-15**

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**To:** Ed Cole, Forest Supervisor, Sierra National Forest  
Ray Porter, District Ranger, High Sierra Ranger District, Sierra National Forest  
Ramiro Rojas, District Silviculturist, High Sierra Ranger District, Sierra National Forest  
Zachary Tane, Forester, High Sierra Ranger District, Sierra National Forest

**Subject: Forest Health survey of Huntington Lake Basin Recreation Area, SNF.**

### Summary

1. At the request of Ramiro Rojas (District Silviculturist), Forest Health Protection surveyed various locations throughout Huntington Lake Basin Recreation area Aug 18 & 19, 2009. Many of the locations examined, were specifically requested by Zachary Tane (District Forester). Both had observed some questionable mortality or fungal conks in stumps. Others were locations where Silviculturist Rojas considered the stands to have density issues, or were approaching basal area thresholds at which increased levels of mortality could be anticipated.
2. Forest Health Protection pathologist and entomologist conclude that the district silviculturist and forester had identified these stands with density-related mortality or at risk for bark-beetle infestation. Stumps adjacent to plot center coordinates that contained fruiting bodies of *Heterobasidion annosum* were located. All of the stumps containing conks were white fir; therefore, it was concluded the predominant Annosum root disease in the Basin is the "S" type.
3. The number of disease or wood decay fungi found fruiting in the Basin was quite remarkable. This list included, *Heterobasidion annosum* "S" type (Annosum root diseases), *Phaeolus schweinitzii*, (cow pie fungus), *Armillaria* fungus (the shoestring fungus), *Echinodontium tinctorium* (E. t. aka Indian paint Fungus), *Cryptoporus volvatus* (the pouch fungus), *Laetiporus sulphureus* (sulphur fungus), *Fomitopsis pinicola* (the red band fungus), *Ganoderma tsugae* (varnish conk), *Melampsorella caryophyllacearum* (fir broom rust), *Cytospora abietis* (cytospora canker of fir), *Peridermium harknessii* (western gall rust) and *Cronartium ribicola* (white pine blister rust). With the exception of white pine blister rust, all fungi are native to the West and considered essential parts for healthy ecosystems. However, some of them are probably at higher levels of abundance than historically before recreational development of the Basin, thus posing a significant Forest Health and public safety risk.
4. Fir engraver (*Scolytus ventralis*), Jeffrey pine beetle (*Dendroctonus jeffreyi*), and mountain pine beetle (*Dendroctonus ponderosae*) were detected in dying and dead trees within the basin depending upon host. Fir engraver activity was most often found associated with Annosum root disease-infected true firs and occasionally with *Echinodontium tinctorium* infected trees. Jeffrey pine beetle was found killing large diameter (25 inches plus) singular or small groups (2-3 trees). Mountain pine beetle activity was variable but not above background levels; some pockets had multiple year attacks per group, while others only few moderate-sized pines.

### **“Forests need a healthy amount of disease.”**

This quote was taken from Professor Paul Manion’s 2003 paper on the “Evolution of Concepts in Forest Pathology” (Manion, 2003). Insects in forested settings – bark beetles in particular – can kill vast numbers of trees. Therefore, the quote should be modified to read, “Forests need a healthy amount of mortality.” Again, with the exception of white pine blister rust (WPBR) all fungi previously listed, are native to western forests. Associated mortality of native fungi can exceed desirable or natural levels (see under *H. annosum*, below) if conditions are suitable for growth. Mortality associated with WPBR is highly undesirable due to an absence of biological controls or conditions to keep infection from spreading. During this field visit no evidence of WPBR-caused mortality of sugar pine or western white pines was observed, only occasional hosts were noted with branch flagging. To retain white pine component within the Basin, FHP recommends that new plantings should include some WPBR-resistant sugar pine seedlings.

### **Bark Beetles**

Mountain pine beetle activity (MPB) was detected in a few scattered pockets within the Basin. Mortality associated with MPB was considered at endemic levels; ground surveys determined that stand conditions were beyond attack-risk thresholds, so attack was imminent. Much of the mortality surveyed was mostly from 2008 or 2007, new attacks were minimal. One location near Road 5S80 where patches of pure lodgepole pines were scattered among mixed-conifer stands, a mortality pocket was assessed back to 2005, in mid-sized pines (16 to 20 inches), basal area 200 ft<sup>2</sup>/acre. The east side of the Basin is where very dense stands of lodgepole pines covered large areas, and where most MPB-associated mortality was detected. On the north side of Rancheria Creek, mortality pockets were surveyed and found only older attacks (2008 and earlier) in small sized-trees (7-12 inches). At the bottom of Road 8S300 and helicopter pad, the forest immediately transitioned from open Jeffrey pines, to dense lodgepole pine stands. Mortality in the drainages was not surprising, since basal areas were as high as 450 ft<sup>2</sup>/acre or more; some trees had simply fallen over from soggy root systems. Older attacks were noted, but again within normal levels of endemic populations. Along Big Creek, mortality was suspected to have occurred possibly due to poor hydrological functioning of the creek. Water drainage was undercutting sidewalls or creating new paths, causing exposure of trees root systems that lined the creek. It was these trees that sustained attack initially (2007), and new attacks appeared to have radiated outward (2008).

A few large diameter Jeffrey pines were found successfully attacked in the Basin, primarily around housing tracts or campsites. Attacks appeared to have concentrated on harsh sites with probable water stress issues. Private vehicles parked immediately next to some trees in housing tracts, most likely added compaction. Two large sized pines (30 and 47 inches) by Cabin #33 were attacked due to beetle development on a nearby windthrown pine.

Fir engraver is a considered non-aggressive compared to *Dendroctonus* species, since they gravitate to volatiles emitted by weakened trees rather than with aggregation pheromones (Macias *et al* 1998); however, widespread outbreaks of this beetle do occur during prolonged drought events or when trees are experiencing other significant physiological stresses. Most often, fir engravers are considered the final agent of demise, but not usually the primary factor. Dwarf mistletoes, root or foliage diseases, or other prior damage will predispose trees to fir engraver attack. Larger fir trees will often be top-killed before they are eventually mass-

attacked. White and red fir appeared to have been affected by the drainage problems near Big Creek as well, fir engraver attacks were also noted to have occurred at the same time and same area as with the lodgepole pine mortality. On the south side of Big Creek, mortality was limited to red fir, most assessed in 2008 from 10 inches up to 44 inch trees.

Recent observations in the Sierras have noticed that white fir mortality due to fir engraver seems variable in location, tree selection, or stand conditions. However, fir engraver attacks did appear to strongly coincide with root disease centers if not other inciting factors. Trees compromised by root disease are often eventually killed by fir engraver. Above Kinnickinnick campground, pockets of attacked white fir were observed, but nearby fir stumps were also detected with Annosum conks. Basal area ranged from 220-300 ft<sup>2</sup>/acre – considered moderately stocked, but fir engraver activity was mostly likely incited by prior Annosum infection.

### *Heterobasidion annosum* “S” type<sup>1</sup>

Although “S” type is native, the prevalence of this fungus within the basin is not considered within historic limits that may have existed before the development of the recreation or housing facilities. Coupled with any previous salvage or thinning operations, the abundance of stumps created also increased the potential for new infections to occur. At the first site near Dowville housing tract, viable conks of *H. annosum* were found inside a 58 inch white fir stump, time of cut unknown. The range of decay classes in variable sized-stumps, led us to suspect some of them might have been over 30 years old. With so many stumps containing *Annosum* conks, it is highly likely that *Annosum* spore production potential of previously thinned stands is much higher than historic levels. With this elevated potential of infection, it is essential that any thinning in the basin be accompanied by Sporax® treatments of fir stumps. Sporax® should be applied according to the Regional Office guidelines and label directions for application.

### *Phaeolus schweinitzii* (cow pie fungus) and *Armillaria mellea*.

*P. schweinitzii* causes root and butt rot of many species. On the Sierra NF, main hosts are Douglas-fir and true firs. As the fungus usually decays the heartwood of the butt and roots, hosts do not often show outward symptoms of infection until late in the disease progression. Usually the fungus does not fruit until after the tree breaks or is windthrown. An evolutionary adapted pathogen does not kill its host early, unless it has the ability to saprophytically colonize the host after death. And then a successful decay fungus has to have evolved the mechanisms to protect its territory from invasion by other decay fungi, such as *Armillaria mellea*. *Armillaria* can kill hosts and continue to colonize dead tissue because it produces (barrier) zone lines and antibiotics to prevent growth of other invading decay fungi. After the death of its host, *P. schweinitzii* will fruit in the ground surrounding the stump. Careful digging will normally reveal a central stalk of the fungus attached to a dead lateral root of the host. The stalk grows upwards out from the root and develops into a spore producing conk that is held above the ground by a central stalk. Since the fungus does not normally fruit on fallen logs the specimen found (Figure 1) was not

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<sup>1</sup> *H. annosum* “S” type may soon to be taxonomically changed to *H. occidentalis*. Otrósina & Garbelotto (*in press*) have molecular evidence that the “S” and “P” types of *Heterobasidion annosum* should be split into 2 separate species. When this taxonomic change is accepted the new name for the “S” type will become *H. occidentalis* and the common name for the disease will probably become *Heterobasidion* root disease

immediately recognizable. A piece of the specimen was dried and sent to the Madison Forest Product lab for identification. Figure 2 is provided to show what a typical specimen looks like.



**Figure 1.** *P. schweinitzii* forming on a cut fir log, with no stalk. The yellow color, white spores, and reaction to KOH confirmed identification.



**Figure 2.** *P. schweinitzii* growing from a root through the duff, fruiting above ground. As the conk grows, pine needles become embedded.

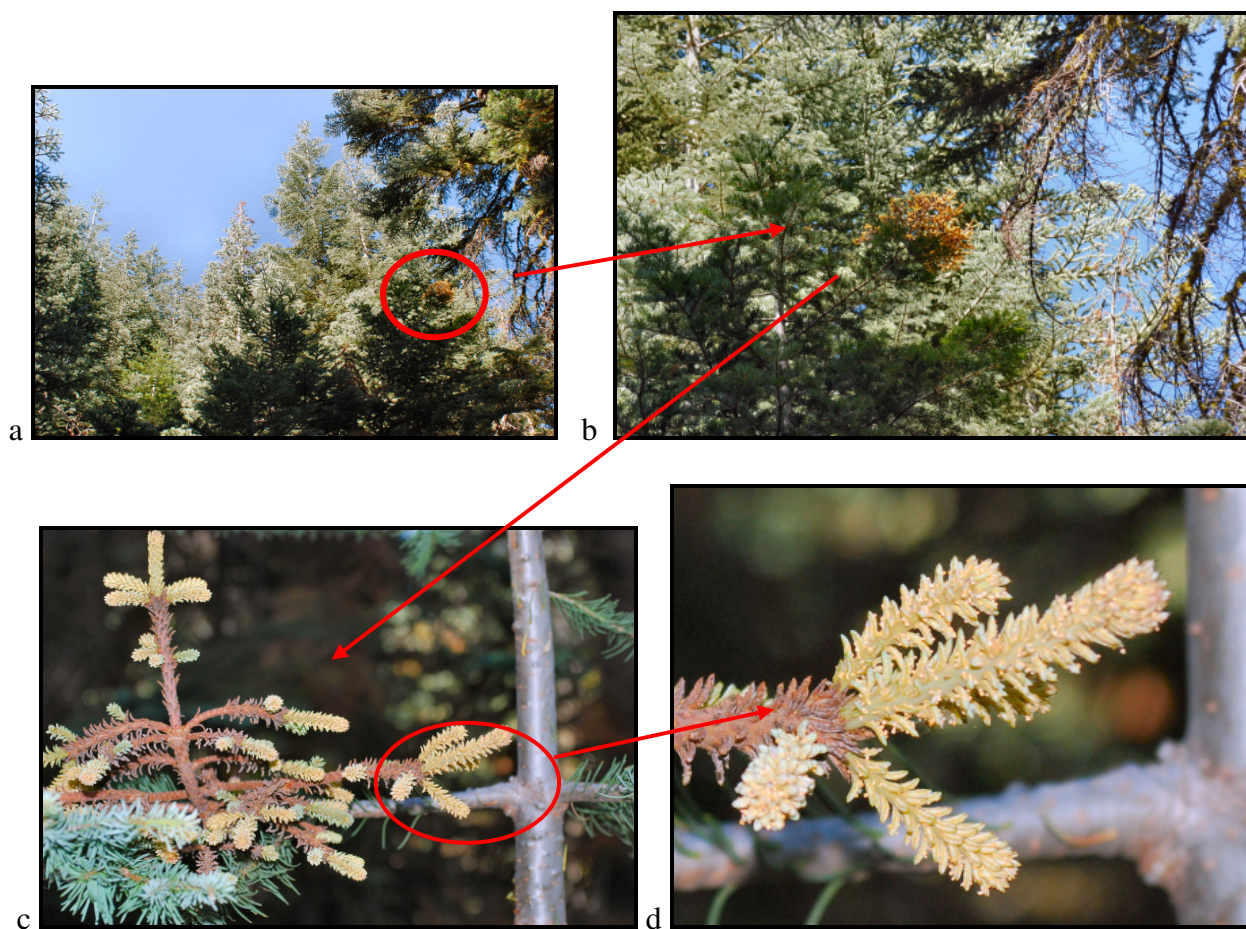
Often damage done by *P. schweinitzii* is underestimated because fruiting usually occurs late in the disease cycle. In this case when the tree was cut, the decay column was found and the log was left as cull. The fungus continued to decay the log and recycle it back carbon dioxide, water, and soil nutrients. While this is a native fungus and natural part of a healthy forest, the presence of spore producing structures highlights the need to minimize basal wounds in any thinning operation.

#### **Dwarf and Leafy mistletoes, *Melampsorella caryophyllacearum* (fir broom rust)**

There are 21 species and sub species of Dwarf Mistletoes (*Arceuthobium sp.*) on conifers in the US, and only 4 species of true mistletoe (*Phoradendron sp.*) on conifers in the US. Two of these true mistletoe species are on junipers, one on incense cedar, and one on white fir. Of the conifers, only white fir has a leafy mistletoe parasite (*Phoradendron pauciflorum*, (Geils *et al*, 2002)). Many foresters have used the presence of leafy mistletoe brooms to identify white fir.

Fir broom rust can also cause noticeable brooms on white fir. While fir broom rust is seldom much more than a mycological curiosity in the south Sierras, it has been recorded as a serious problem in the Rocky Mountains and Great Basin (Peterson, 1964). During the site visit, the rust fungus was approaching the period of maximum aecial spore production; thus very obvious on true firs. Most of our observations were on white fir. Although it is documented to attach to red fir, we never observed it on this field visit.





**Figures 3 a-d.** *Melampsorella caryophyllacearum* fir broom rust. A montage of images to show the rust on various scales. The aecial pustules are clearly visible in 3d.

The fir broom rust (like white pine blister rust) requires two hosts to complete its life cycle. The fungus on fir must infect an alternate host before infecting a new fir host. The fungal infection of the fir leads to short upright branches with thicker than normal needles; late in the summer yellow pustules of the aeciospores are produced. These spore pustules can clearly be seen in Figures 3c and 3d. The yellow spores produced on the fir do not infect other fir trees; they infect chickweeds. Chickweed is generic for species in the genera *Stellaria* and *Cerastium* plus other members of the family Caryophyllaceae. Before a new fir can be infected, the fungus has to infect an alternate host and produce basidiospores that will disperse.

Since fir broom rust has not been monitored, it is unknown whether there is an upswing in this fungus or not. Most likely the time of maximum expression was occurring during the service visits, and observed frequently. This fungus is mentioned because, like the previously described *Phaeolus schweinitzii*, it is obviously in place to negatively impact the stands of the basin if they are stressed by drought or increasing resource competition as stands become more dense. The mortality these and all the others stress agents (*e.g.* annosum, bark beetles etc) can cause amounts to a “biological thinning”. Left unthinned, there will be tree mortality driven by biological agents discussed. These agents will complete their life cycle and in so doing, divert tree biomass to the production of fungal or insect biomass. Silvicultural prescribed thinning will

improve existing overstocking conditions – a reduction in density not accompanied by an increase in deleterious insect and fungal biomass. Thinning is an effective management tool to mimic natural selection by native insects and fungi. Not all fungi or insects are deleterious to forest health – in fact the vast majority of insects and fungi are beneficial and necessary to sustaining productive ecosystems.

### *Laetiporus sulphureus* (Sulphur fungus)

The British spelling of sulfur was used to show where the Latin spelling of the species name came from. While surveying for Annosum conks (stump busting) in the forests of our Service Area, we have developed a search image for what is likely to be a good candidate stump for having an included *H. annosum* conk. One feature consistently associated with an absence of Annosum conks has been the presence of boring “beetle” exit holes (image 4a). The insect that made these exit holes was presumably a longhorn beetle, (metallic wood borer exit holes tend to be “D” shaped); although they could have been made by a Siricid (a wood wasp). Regardless of the insect, the take home message is “some insect prevented the Annosum fungus from utilizing this stump and thus producing damaging fungal spores. Given a chance the fungus would have converted some of the wood biomass into fungal biomass (spores), carbon dioxide and water vapor.



**Figures 4a & b.** (a) Exit holes of wood boring insect, (b) part of a fruiting body of the sulfur fungus.

Figure 4b is a close-up of *Laetiporus sulphureus* fruiting body in its early stages. This fungus is, like the boring insect converting stump biomass into fungal biomass, carbon dioxide, and water. The beads of water seen on the fungus may well represent the physiological water that is released when the fungal enzymes degrade cellulose. This fungus does not have the enzymes necessary to decay lignin and as a consequence, produces a brown cubical rot, containing a high percentage of lignin. While this fungus has been occasionally implicated in the butt rot and failure of living trees, it is most often just associated with the recycling of dead trees. The most commonly encountered decay conk belonged to the ubiquitous red belt fungus (*Phomitopsis pinicola*), another brown rot fungus. The brown rotted wood created by *P. pinicola* makes an ideal seed bed for the germination of conifer seeds (Image 5a-b). By recycling dead wood, these organisms deprive the disease fungi *Armillaria* and *Heterobasidion* of material upon which to establish.





**Figures 5a & b.** One beneficial value of brown rotted wood is that it is a good substrate for conifer seedlings to establish upon. Note (b) the amount of their resources seedlings must divert to root production if they are to survive.

### *Echinodontium tinctorium* (E.t., Indian Paint Fungus)<sup>2</sup>

Filip *et al* (2009) have updated the FIDL on this fungus and much of the information presented here is derived from that leaflet. Indian paint fungus is essentially a decay organism of non-living parts of the tree so symptoms are slow to impact growth or structure. It decays the non-living heartwood of maturing trees. While the Indian paint fungus might have a delayed impact upon individual true firs, Filip *et al* (2009) state that this fungus is responsible for 80% of the decay in old growth grand and white fir in Oregon and Washington, and 30% of the decay in advanced regeneration. Wood *et al* (2003) state that in some stands in California nearly half the gross true fir volume is decayed by this fungus. In our service area this fungus might well come in as the second most common threat to white fir. *Heterobasidion annosum*, is the greatest threat to white and probably red firs too. Parts of the West that were historically pine dominated have (due to fire exclusion, selective logging, and grazing) become dominated by the shade intolerant firs. Both *H. annosum* and *E. tinctorium* infections now appear at levels much higher than would have been found in pre-settlement times. Thus any silvicultural intervention in the Huntington Basin aimed at retaining large firs while increasing overall stand health must focus on reducing infections by these two fungi. In North *et al* (2009) state, “Disease incidence does not necessarily indicate that a tree is genetically more susceptible and therefore should be culled”. While this might be true in some contexts, it should not be taken to indicate that sanitation should not be done. The goal of sanitation is to remove potential inoculum sources, prevent the production and spread of spores.

The spores of the Indian paint fungus prefer to infect small exposed stubs of shade-killed branchlets on suppressed trees rather than wounds or large old branch stubs. After a period of initial growth (establishment) the 1/8<sup>th</sup> inch wounds become overgrown and the oxygen level

<sup>2</sup> “J. B. Swan, the original collector reported that the Indians from the Admiralty Islands (Alaska) obtained a rust-red powder from the ground basidiocarps which was used for the preparation of dyes and paints. Interestingly, the Wasco Indians of Oregon used the fungus as a bactericidal agent and the crude material has been found to exhibit antitumor properties”. Taken from Ye *et al* (1996) to explain the species name.

available to the fungus is reduced as the fungus enters a dormant phase. The fungus can remain dormant for 50 or more years, in which time the host tree has time to develop heartwood. Fungal dormancy can be broken by many things, primarily an increased amount of oxygen being available to the fungus. Mechanical wounds, top breaks, frost cracks or fir engraver attacks can all provide a way for increased oxygen to reach the dormant fungus and activate it to begin decaying the heartwood of the maturing fir tree. Thus fir stands that originate from suppressed understories have a high potential for the development of Indian paint heart rot after a late thinning.

### Indian Paint and the Cedar Crest Resort.

At Crest Resort, the current fir dominated stand conditions are optimal for the development of Indian paint fungal infections of the current maturing trees. During this visit, Forest Service had removed standing and fallen hazard trees, and some additional hazards that were not apparent to us on our earlier visit. These images are included to display the range of decay symptoms this fungus can exhibit.



**Figures 6a-d** (A) a cabin that had a near miss with a hazard tree, (b) piece of a tree hollowed out by the Indian paint fungus, (c) the living shell of sap wood denoted by the red arrow and the radius denoted by the blue arrow. When the shell thickness falls below  $1/3^{\text{rd}}$  of the radius the tree is defined as being a hazard tree. (D) Showing. *Armillaria* mycelial fans under the bark of an Indian paint fungus infected tree. The paint fungus is decaying the heart wood and the *Armillaria* is causing a root rot.



Figures 6a shows a hazard tree near miss towards a cabin underneath. Figure 6b shows despite rot appearing red to brown in color, this is a white rot fungus digesting both cellulose and lignin, eventually hollowing out the tree. Figure 6c was included to show that *E. tinctorium* is a heartrot fungus leaving the sapwood intact. The standard rule for removal of hazard trees is: if the shell thickness (red arrow) falls below one third of the radius (blue arrow) remove the tree. In Figure 6c the tree was a hazard and promptly taken down. The sapwood shell thickness kept this tree standing until FS had been able to safely remove it. An examination of adjacent tree stumps revealed *Armillaria* infection (Figure 6d) at stump height on a tree that had been hollowed out by Indian paint fungus.

### **Indian Paint at Kaiser Loop trailhead (Indian Paint Decay can look like *H. annosum* decay)**

At the Kaiser Loop trailhead, a large (67 inches) white fir that had snapped off at about 40 ft. The top half exhibited a decay pattern at first glance be mistaken for *H. annosum* (Figures 7a- d). This snag bore several Indian paint conks (Figure 7a). The basal region of the snapped top were clearly delaminated and initially looked like *H. annosum* decay (Figure 7b). However, further up the breakage (Figure 7c) the decay could clearly be seen as stringy rot: delaminated sheets of late wood shredding into thin strips. While Indian paint fungus had rotted the dead heartwood of this fir, it was another fungus that had killed and rotted the sapwood. In Figure 7d, double headed arrows denote the sapwood has clearly been rotted by a cubical brown rot fungus. In this case, the heartrot fungus (Indian paint) decayed the center of the tree leaving only the shell of sapwood alive. It was this thin shell providing all of the structural support. If the shell had not failed, Indian paint fungus would have continued to decay the center, eventually hollowing it out. In their publication Philip *et al* (2009) opted to give this fungus the common name “Rust-red Stingy Rot”. They chose this name because other publications describe it as a brown rot and technically it is not a true brown rot. Brown rots can only decay cellulose, leaving the lignin undigested (see arrows on Figure 7d). Given time, this fungus can decay all parts of cell walls leaving a completely hollowed out log (Figure 6b).



**Figures 7a-d.** (a) A snapped 67 inch white fir with conks of *Echinodontium tinctorium* (marked with arrows); (b) the base of the snapped top the wood is delaminated in the same manner as is found in *Heterobasidion annosum* decay; (c) further up the snapped top the delaminated decay becomes more of a stringy rot; (d) Indian paint fungal decay is restricted to the heartwood, while the sap wood (marked by red doubleheaded arrows) has been decayed by an unknown brown cubical rot fungus.

### ***Cytospora* and Dwarf Mistletoe**

Although *Heterobasidion* root disease is the biggest threat to true fir in general, and Indian paint fungus is the primary threat to maturing firs, the most visible damage is flagging caused by *Cytospora* canker fungus *C. abietis* (see Figure 8). White fir is attacked by a true mistletoe as previously mentioned, but both true firs (in fact all gymnosperms in the Basin) are attacked by dwarf mistletoes. Dwarf mistletoes that attack red and white fir belong to different sub species of *Arceuthobium abientinum* (sub species *A. abientinum* f. sp *concoloris* on white fir, and *A. abientinum* f. sp *magnificae* on red fir.) While white fir dwarf appears omnipresent in the south Sierras, it was uncommon to find saplings or pole-sized white fir with mistletoe plants on them

in the Basin. However, white and red firs with branch flagging typically infected with *Cytospora* cankers were prevalent, that lack of sightings of white fir dwarf may have just been a sampling effect.



**Figure 8.** Red fir showing severe flagging from *Cytospora*.

The basic etiology of *Cytospora*-mistletoe complex is as follows: subsequent to red fir becoming infested with the red fir dwarf mistletoe, the fungus *Cytospora abietis* uses the wounds created by the mistletoe roots to gain entry into the host. *Cytospora* is a relatively weak pathogen, so it utilizes wound openings left by dead mistletoe plants on branches to provide infection courts. Once infected, this weak parasite kills the branches, causing red flagging (Figure 8). It has not been proven that *Cytospora* and dwarf mistletoe complex alone will kill fir trees. However, when combined with prolonged drought and high stocking levels, this complex might be enough to kill smaller individual trees. Establishing photopoints on the SNF to follow the fate of heavily cankered firs to see what percentage die and when, would help provide information for future project planning. In stands with plenty of advanced fir regeneration and an overstory of heavily mistletoe infested firs, removing overhead mistletoe seed sources is highly recommended to protect the next generation.



### **Discussions and recommendations concerning Huntington Basin.**

Although this report has not dealt with all of the insects and fungi encountered, it is emphasized that there are enough sources of potential fungal spores that could adversely impact the existing stands if not impeded. Thinning treatments will not reduce the genetic susceptibility of individual trees to diseases, but it will reduce spore loads to which residual trees will be exposed. Thinning should be guided by reducing inoculum potential, and Sporax® application be enforced to reduce *Heterobasidion* root disease risk that unprotected stumps pose. Density reductions should increase available water and nutrient potential, and improve stand resiliency to the drought cycles that are common in California. Based on ground surveys and risk modeling of most current stand conditions in the West, it appears the risk potential for insect or disease driven mortality is much greater than in the past. Past logging practices favoring shade tolerant fir, combined with an inconsistent history of Sporax® application has lead to a build up of spore producing conks of *Heterobasidion annosum* within large stumps. Past histories of stand conversion from mixed pine towards fir dominant has allowed Indian paint fungus to become more prevalent than historically when stands had a greater pine component.

Some bark beetles and pathogen mortality can be reduced to acceptable levels by silvicultural treatments that improve individual tree vigor and growth. In areas where species and age diversity were well mixed and stands not heavily stocked, mortality was minimal (less than 1 tree per acre). Management should focus on prevention of a build up of insect populations and fungal inoculum. Thinning treatments to reduce overcrowding (below bark beetle risk thresholds) will help prevent and mitigate mortality should outbreaks occur, but should be done with extreme care of the forest floor (Laacke & Tappeiner 1996). Selection of individual trees can be assessed by crown characteristics as to which trees would be most likely to die within the next ten years (Ferrell 1980). Egan (2008) found that thinning did reduce the number of trees killed by fir engraver during times of extreme drought, but also could be attributed to less available host. Yet density reduction will assist with reducing ground fuel buildup or hazard trees potential. Native insects and diseases do have their role in creating openings for new seedlings, wildlife habitat, and naturally thinning overly dense stands.

A large percentage of Huntington Basin is true fir (mostly red), therefore it is strongly recommended that future management first consider dwarf mistletoes and root diseases when developing plans to improve forest health. These pests are ubiquitous and contributing to much of the mortality in the basin. The prevention and restoration of root disease centers and heavily infected mistletoe individuals is critical to improving survival for the next generation of trees.

From Forest Health perspective, managing the health of these fir dominated forests in the Basin is critical to maintaining public safety for all. The designation of Huntington Basin as a recreation area enforces that public safety cannot be compromised if dead trees pose dangerous injury or wildfire hazards. Strategically placed thinning treatments within and around high-value areas will promote tree vigor as well as safety. Silviculturists plus ecologists will determine desired species diversity and long-term future stand conditions for this area, while fuel experts should help minimize exposure to fire risks.

For more information or questions regarding this report, please contact South Sierra Shared Service Area, 209-532-3671.

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